Protocol for the identification and prioritisation for management of *Phytophthora cinnamomi* 'protectable areas'

Dieback Consultative Council

Advice to the Minister for the Environment prepared under Section 16(e) of the Environmental Protection Act

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Context and background

The primary purpose of this EPA report is to provide advice to the Minister for the Environment under Section 16(e) of the Environmental Protection Act (EP Act) on the report titled *"Phytophthora cinnamomi* and disease caused by it – a protocol for identifying 'protectable areas' and their priority for management", (hereafter called 'the protocol'). The Minister requested "that the EPA review the report and protocol prepared by the Dieback Consultative Council and provide advice in the context of the environmental significance of *Phytophthora cinnamomi* (dieback) and implications of the protocol for its management in Western Australia".

In developing its advice to the Minister, the EPA has been greatly assisted by the public submissions made in response to the EPA's invitation issued in June 2000.

Phytophthora cinnamomi is recognised nationally and internationally as a major threat to biodiversity (ecosystems, species and genetic levels) and the ecological functioning processes of many ecosystems.

The EPA has recognised that, in view of the complexity of ecosystems and temporal changes in site conditions, the management of the key threatening process posed by the pathogen *Phytophthora cinnamomi* is a very difficult task, as many infested areas will continue to expand and spread to uninfested areas at varying rates. The protocol attempts to focus on managing human behaviour to minimise the role of people in spreading the pathogen. The spread of the pathogen is a significant threat to aspects of the State's biodiversity, and thus the approach to threat abatement must always be one of continuous improvement in research, policy, strategic planning and management. It is in this context that the EPA provides its advice, not only on the protocol, but also on some wider issues. In providing this advice, the EPA is mindful that the Parliament has now established a Conservation Commission whose functions include that of advising the Minister for the Environment on the development of policies for the conservation and management of biodiversity and biodiversity components throughout the State.

The community would be concerned if the broad scale adoption of the protocol led to an accelerated spread of *Phytophthora cinnamomi* within the jarrah forest and other ecosystems where these were not defined as 'protectable' areas. There is a need to clarify acceptable operational activities in all areas to achieve best practice through minimizing soil movement and human activities which may increase the risk of spread or intensification. Risks of new infections are higher when moist soil, mud or gravel is transported in any way from infected to uninfected areas of bush, heath or forest. Protectable areas, by definition the most secure from natural spread of the pathogen, may be put at risk if there are no seasonal constraints on activities.

Advice on the protocol

The EPA advises the Minister that the protocol prepared by the Dieback Consultative Council be endorsed but that it be on a trial basis with rigorous documentation of the trial and an independent review of the outcomes of the trial within three years. The EPA is of the view that long term implementation of the protocol should only be continued if it has been demonstrated

that the protocol is an improvement in the management of *Phytophthora cinnamomi* in State Forest areas.

Other advice

A summary of the EPA's advice to the Minister for the Environment, not only in relation to the protocol but also on some wider issues involving *Phytophthora cinnamomi*, is given in Section 7 of this report. This includes matters of operational procedures under the precautionary principle, funding for management and research, research programs, the clarification of the roles and responsibilities of the Dieback Consultative Council and the Conservation Commission, and the need for a public awareness program.

The EPA advises that urgent attention should be given to Recommendation 4 of the Western Australian Dieback Review Panel (Podger, *et al*, 1996) which states that attention should be focused "on minimising access during conditions which are conducive to dispersal of the pathogen".

An elementary way to protect the endemic flora of the South-west from *Phytophthora* species is to encourage all machinery operations to be undertaken at times when surface soil conditions are dry. There is an urgent need for this simple message to be conveyed to the community. This advice complements and would strengthen the recommendations 4 and 22 made by the Dieback Review Panel and endorsed by the Government (see Appendix 1). The EPA encourages accountable agencies to seek solutions at a technical level which can be translated into auditable codes of practice and management guidelines.

On the matter of funding, the EPA advises that detailed attention should be given to Recommendations 31, 32 and 33 of the 1996 Review of Dieback in Western Australia (see Appendix 1). These recommendations included the words "the State investigate ways and means of applying the user pays principle", "that ways and means be sought which would enable charging of all industries … for their share of management and research costs", and "an identifiable proportion of royalties and other charges and payments levied be allocated to dieback related research".

The EPA advises that there is an urgent need for the research effort on *Phytophthora cinnamomi* to be invigorated and efforts should be made to establish a Centre of Excellence for Dieback Research. The Dieback Research Advisory Committee should be requested to develop, as a matter of urgency, a priority research program together with proposed funding arrangements, and be circulated for public information.

The Conservation Commission of Western Australia has now been established with a broad responsibility to develop policies to protect the natural environment for present and future generations. The Commission should be requested to liaise with the Dieback Consultative Council to avoid any duplication of roles in relation to their respective responsibilities.

Finally, the impact of *Phytophthora cinnamomi* is of such importance that there should be an on-going awareness program to inform the public about its significance as a key threatening process. A program with similar status to that of 'Western Shield' and 'Project Western Everlasting' should be developed for the protection of flora and vegetation at risk of extinction from *Phytophthora cinnamomi*.

1. Introduction

1.1 Purpose

The primary purpose of this EPA report is to provide advice to the Minister for the Environment under Section 16(e) of the Environmental Protection Act (EP Act) on the report titled "*Phytophthora cinnamomi* and disease caused by it – a protocol for identifying 'protectable areas' and their priority for management" (hereafter called 'the protocol'). The Minister requested "that the EPA review the report and protocol prepared by the Dieback Consultative Council and provide advice in the context of the environmental significance of *Phytophthora cinnamomi* dieback and implications of the protocol for its management in Western Australia". The protocol and policy document were prepared to facilitate implementation of Recommendations 1, and 3 of the Review of Dieback in Western Australia (Podger *et al* 1996: Report of the Dieback Review Panel, referred to as the WADRP) which were endorsed by the Government in 1997.

A copy of the protocol can be found in a package of three documents made available by the EPA in June 2000 (see section 1.4 of this report).

In developing its advice the EPA has taken the view that it should provide some additional information, discussion, comment and advice, noting that dieback is of such importance to the nation that it was listed as a key threatening process in the Commonwealth Endangered Species Protection Act 1992 when it was proclaimed, and has been retained as a key threatening process under the Commonwealth Environmental Protection and Biodiversity Conservation Act 2000 (EPBC Act 2000). The EPA has also provided brief comment on the document "Management of *Phytophthora* and disease caused by it" (Policy Statement Number 3, as prepared by CALM and included in the EPA package).

1.2 Scope

The EPA advice has taken into account the environmental significance of *Phytophthora cinnamomi* in Western Australia as well as the overall objectives of the EPA to protect the environment.

Consideration has been given to the development of a national "Threat Abatement Plan for dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)" by Environment Australia in response to the pathogen status of dieback as a "key threatening process" under the EPBC Act 2000.

The environmental implications of applying the protocol and CALM Policy Statement Number 3 state-wide have been considered in relation to state, national and international agreements concerning sustainable development and the conservation of biological diversity.

The protocol for the implementation of Recommendations 1 and 3 of the WADRP has been considered in relation to the other 31 accompanying recommendations (Appendix 1). The key recommendations concerned with this review are:

> Recommendation 1. *That government adopts a dieback management strategy which identifies significant protectable areas (those for which the values at risk are significant and the benefits of hygiene likely to be sustained for more than a few decades), prioritises them and concentrates available resources on rigorous application of hygiene for their protection.*

Recommendation 2. *That fewer restrictions on access be applied to and within essentially unprotectable areas.*

Recommendation 3. *That CALM urgently develop protocols for the objective identification of protectable areas and for their prioritisation and management.*

Recommendation 4. *That industry, institutions and government agencies jointly address the extent to which operational schedules can be modified to ensure that activity on the protectable areas is focused on minimising access during conditions which are conducive to dispersal of the pathogen and its establishment.*

The EPA understands that the protocol, if accepted by the Minister, would be:

- applied and implemented by the Conservation Commission and CALM for all operations and developments on land under their control, either through vesting or management;
- taken into account by the EPA in the assessment of new proposals; and
- promoted to landholders throughout Western Australia as the basis for management of the *Phytophthora cinnamomi* threat.

1.3 Key principles

In reviewing and reporting on the dieback protocol and background material prepared by the Dieback Consultative Council for the Minister for the Environment, the EPA has been mindful of the principles, goals and objectives underpinning the National Forest Policy Statement, the Regional Forest Agreement for the South-west Forest Region of Western Australia and the CALM Forest Management Plan 1994-2003. They include:

- ecologically sustainable forest management;
- the precautionary principle and adaptive management; and
- the conservation of biological diversity.

1.4 Public input

In June 2000 the EPA invited public submissions on the protocol for managing dieback, the disease caused by *Phytophthora cinnamomi.* The EPA provided a package of three documents. The documents were:

- "*Phytophthora cinnamomi* and the disease caused by it - a protocol for identifying 'protectable areas' and their priority for management", as submitted to the Minister for the Environment by the Dieback Consultative Council (March 2000);
- CALM Policy Statement Number 3: "Management of *Phytophthora* and disease caused by it"; and

- Background to the Revision of CALM Policy Statement Number 3: Management of *Phytophthora* and disease caused by it - Background paper prepared by F.D Podger and K. R.Vear (July 1998).

Twenty-two submissions were received (Appendix 4) and they are publicly available, except for any marked 'in confidence'.

1.5 Additional advice

The EPA was greatly assisted by having two documents prepared for the EPA on aspects of dieback: one by Ms Sally Robinson, former Deputy Chairman of the EPA, and the other by Dr Joanna Young, who is a forest pathologist. The EPA also sought other expert advice from a range of professionals, including scientists, land managers and others involved with assessment and research activities associated with dieback.

2. Context and background

2.1 Context

The advice and recommendations in this report have been formulated in the context of the:

- Advice of the Advisory Committee to the EPA on Forest Management Plans (in EPA 1998 Bulletin 912);
- Regional Forest Agreement for the South-west Forest Region of Western Australia between the Commonwealth of Australia and the State of Western Australia, Commonwealth & Western Australian Governments (1999);
- National Strategy for the Conservation of Australia's Biodiversity, Commonwealth Government (1996);
- National Strategy for Ecologically Sustainable Development, Commonwealth of Australia (1992); and
- Inter-governmental Agreement on the Environment, Commonwealth Government (1992).

The EPA has noted that Recommendation 8 of the WADRP states:

> *That the Department of Environmental Protection and CALM together ensure uniform application of restraints on access by all significant users in threatened areas.*

The DEP has informed the EPA that in its submission to the Dieback Consultative Council (DCC) on the new dieback protocol dated August 1999, it stated:

> *With respect to the wording of Recommendation 8, it should be noted that it is the EPA and the Minister for the Environment that have the statutory functions under the EP ACT. As such, the constraints applied to industry or for the management of development proposals under any future dieback related policies and protocols (and implemented through compliance with environmental conditions of development approval or other*

mechanisms) would need to be determined and recommended by the EPA in accordance with the EP Act, then set by the Minister prior to audit or enforcement by DEP.

The role of the DEP in relation to dieback as an environmental factor is to provide support to the EPA in its assessment and management of projects or to the development of policy.

Recommendation 8 envisages a common CALM and DEP (EPA) position on requirements for management of *Phytophthora* and this is supported by the EPA as a necessary objective. *Phytophthora* management is one of the environmental factors that the EPA has to consider both in the assessment of new proposals and in the ongoing management of existing proposals in terms of the potential impacts on the spread and intensification of *Phytophthora cinnamomi* and the consequences for the environment. The EPA has commented on dieback in previous Bulletins with respect to forest management (EPA Bulletins 329, 652 and 912).

The recommendations of the WADRP (Appendix 1) were endorsed by the Government and the method and extent of their implementation are significant issues of public interest.

2.2 Background

The recommendations resulting from the last two major reviews of dieback in WA and a summary of the national draft Threat Abatement Plan are attached in Appendices 1, 2 and 3.

Included are:

- The 33 recommendations of the Dieback Review Panel 1996, which were endorsed by the Government and the implementation of which the Dieback Consultative Council is now responsible (Appendix 1);
- The 23 recommendations of the final (1992) report of the Legislative Council Select Committee into Dieback diseases (Appendix 2); and
- A summary of the draft Threat Abatement Plan for dieback caused by the root-rot fungus (*Phytophthora cinnamomi*), Environment Australia, July 1999 (Further development of the Threat Abatement Plan is ongoing) (Appendix 3).

CALM also made available supplementary Departmental material including guidelines currently in use titled:

"*Phytophthora cinnamomi* and disease caused by it":

Volume 1. Management guidelines;

Volume 2. Interpreter's guidelines for detection, diagnosis and mapping; and

Volume 3. Phosphite operations guidelines.

One other publication titled "Managing *Phytophthora* Dieback", sub-titled "Guidelines for Local government", and prepared by a Dieback Working Group, was launched in April 2000. Membership of this Working Group consisted of 17 stakeholders representing Local Government, Government Departments and conservation groups. Support and financial assistance were provided by Local, State and Federal Government programs. A project officer has conducted a

number of workshops for both metropolitan and country Shires explaining the guidelines to Shire staff. In addition, the Dieback Working Group has published a supplementary booklet: "Managing Dieback in Bushland - A guide for landholders and community conservation groups".

3. The protocol

3.1 Public comment

The EPA received 22 submissions on the protocol. Whilst some of the submissions endorsed the protocol, others raised valid concerns that the application of the protocol would not assist in the control and management of the pathogen.

The EPA has been greatly assisted by the public submissions in its review of the protocol and the preparation of its advice. These submissions are publicly available from the EPA, except for any marked 'in confidence'.

3.2 Observations in relation to the protocol

In considering the protocol the EPA has come to appreciate the complexity of the tasks. Observations in relation to the protocol follow.

3.2.1 Principles

The EPA is of the opinion that dieback is an important factor in giving attention to the principles of ESFM, in particular the precautionary principle, adaptive management and the conservation of biological diversity in the development of a protocol for the evaluation and management of areas at risk of invasion by *Phytophthora cinnamomi.*

Guiding principles and strategies to achieve ESFM are relevant in adopting principles for dieback management. Items of specific relevance relate to the maintenance of:

- biodiversity;
- the productive capacity and sustainability of forest ecosystems; and
- the health and vitality of the forest ecosystems.

Dieback is a key threatening process, and it can be argued that:

- inappropriate human-induced disturbance of high-quality habitat areas should not be allowed;
- activities/disturbances which threaten forests, forest health or forest values should be minimised; and
- threats from activities or disturbances to forest ecosystems from introduced disease, plants and animals should be reduced or avoided.

These suggestions for management were made in the assessment of ESFM for South East Queensland (McDonald *et al* 1999).

The same document prepared for SE Queensland provided a valuable statement about the application of the precautionary principle:

> *A satisfactory application of the precautionary principle requires the following elements of an adaptive forest management system be operational and effective:*
>
> - *Public participation to expose and resolve differing perspectives on risk;*
> - *Production of management plans that define environmental targets monitoring protocols and evaluation procedures.*
> - *Open processes of reporting environmental outcomes, and for review and improvement of plans and practices. The adequacy of monitoring programs must be addressed explicitly.*

The EPA suggests that the elements set out above for the application of the precautionary principle are relevant to the management of dieback and the development of any future drafting of dieback policy.

The EPA is aware that CALM and the Forest Products Commission are developing an Environmental Management System (EMS) to ISO 14000 standards. The audit requirements of the EMS should apply to the procedures adopted to minimise the spread of *Phytophthora cinnamomi*.

3.2.2 Vulnerable areas

Additional public information is required to assist the community in understanding the issues related to the vulnerability of flora and vegetation to infestation by *Phytophthora cinnamomi* in the field. A flow chart for determining vulnerability of flora and vegetation to damage and the delineation of protectable areas has been developed. The question of what is 'vulnerable' to disease may have been over simplified and input from a wider range of scientists is likely to be required to clarify a workable approach. Consideration should be given to the development of criteria such as underlying site conditions favourable to the disease, the vegetation types, the presence of rare, threatened or endangered species and communities, areas of high enderism, old growth areas, diverse ecotype zones, and the vulnerability of species present in any area of planned operations. This approach is consistent with pre-operational activities undertaken by many proponents in Western Australia.

The EPA is of the view that steps to evaluate the conservation status of an area should precede application of the current protocol. Such an approach would help in setting priorities for management for agencies with lands which would not meet the current protocol's criteria for 'protection'.

3.2.3 Protectable areas

The concept of defining priority areas for management is sound but there has been some difficulty in interpreting some aspects of the technical detail as it appears to be dependent on the judgement of individuals. There is a need to develop further guidelines to assist in the professional judgements required. The determination of the boundaries of protectable areas is dependent on predicting where the pathogen may spread to in a 20-30 year time frame. This would seem to be one of the most difficult tasks confronting dieback interpreters, as local site conditions can vary significantly and over different time frames. For example, the shift from the higher rainfall levels in the 1960's to the lower rainfall levels since the 1960's may have had significant influences on the soil moisture conditions and therefore the vulnerability of sites to *Phytophthora cinnamomi*. A time frame is used to define protectable areas. However, as set out in the protocol document, "downhill rates of spread can be much greater (than 1 metre a year) but are generally unpredictable". The complexities of mapping and the range of temporal changes that can occur in communities vary greatly between ecosystems and the mosaics of vegetation types present.

The knowledge base on which to predict disease infestations is deficient in some ecosystems. It would seem to be inappropriate for the proposed protocol to be adopted in its current form in any area where little is known about the epidemiology of *Phytophthora cinnamomi*.

The criterion that any lands freely accessible to the public automatically renders them not worthy of active protection (unless rare species are present) is of concern to the EPA and does present problems for the application of the protocol to non-CALM lands.

The EPA encourages the application of the precautionary principle if the disease status of an area cannot be determined. The physical and biological values present should be evaluated before a management strategy for such areas is adopted.

3.2.4 Information gaps and terminology

The spread of the pathogen is a significant threat to aspects of the State's biodiversity, and thus the approach to threat abatement must always be one of continuous improvement in research, policy, strategic planning and management.

The protocol sets out that "a comprehensive survey for identifying 'protectable areas' across the Southwest land division is beyond the State's resources". However, this has to be considered in the context of the *Phytophthora cinnamomi* being a major threat to biological diversity as well as Recommendations 31, 32 and 33 of the Dieback Review Panel about funding possibilities (see Appendix 1).

There will always be gaps in our knowledge of the distribution of ecosystems and species which are vulnerable to *Phytophthora cinnamomi* in the southwest areas, and there will be on-going costs in pursuing that knowledge. Nevertheless, the strategic planning process should identify the information required so that it can be fed into research programs being developed. At the very least, a comprehensive assessment of the physical and biological values of proposed operational areas should be required prior to any activity being undertaken. It may then be possible to set a wider range of options for management.

In areas supporting rare or vulnerable plants communities it may be advisable that no activities

proceed without detailed strategies to minimise risks of introducing *Phytophthora cinnamomi*. In other areas priority may determine that the rigorous application of hygiene, as suggested in Recommendation 1 of the WADRP report, would mean that activities be restricted to dry soil conditions as well as machines being cleaned down before being allowed entry. Lower priority areas would be afforded the level of protection currently suggested for protectable areas, which means only clean on entry.

There are a number of problems with the terminology presented in the protocol and this area of policy implementation requires further work so a clear set of guidelines can be made available to all machinery operators active in areas of dieback risk. The "Guidelines for Local government" document discusses high priority sites, which would not be classified as high priority for management following the protocol presented by the DCC, and consideration should be given to assigning an alternative name for the category 'unprotectable'. This term can convey mixed messages to operators and could cause confusion.

3.3 EPA's consideration of the issues associated with the application of the protocol

CALM adopted an interim protocol during 1999 and management guidelines based on defining protectable areas, and this interim protocol has already been in place for 12 months. A range of issues has arisen since implementation of the protocol and the DCC has been reviewing these issues.

The need for uniform understanding of the details associated with the application of the protocol has been recognized by experienced interpreters of the disease. The two issues which have been raised are the management of the buffers and boundaries around protectable areas (they will not be permanently marked on the ground) in the medium- to long-term, and the status of roads. Once an area is roaded for logging, a protectable area could be downgraded in its management status to unprotectable if the public is not deterred from entry. Application of the protocol will not assist agencies such as the Main Roads Department in setting priorities for the management of remnant vegetation, despite this agency's previous commitment to minimising the spread of the pathogen by including dieback conditions in contracts for works.

The management status during logging of disease-free buffers around protectable areas may also require review depending on the types of forest experienced. Situations could arise whereby the resource in the uninfected buffers could be accessed through damp, infected lowlands heightening the risks of human accelerated spread of the disease.

3.3.1 Management of unprotectable areas

The EPA is concerned about the lack of guidelines for the management of unprotectable areas although parts of such areas may currently remain disease-free and have considerable conservation and social values. For example, the inference is that infected gravel can be used freely in road building in such areas. No incentive is provided to community members or Local Government to follow guidelines aimed at minimising the spread of the pathogen or its impact in areas accessed by the public because they are considered unprotectable.

3.3.2 Seasonal constraint on activities

It appears that Recommendations 1, 2 and 3 of the WADRP's report have been implemented without giving simultaneous attention to other recommendations which are of critical importance if the rate of dieback spread is not to be accelerated. Recommendations 4 and 22, which relate to the development of the most effective hygiene methods, are most important. Recommendation 22 states that:

> *Progressive refinement of hygiene strategies which will reduce risk of infestation in operations be undertaken.*

Specific suggestions are made with respect to this recommendation in the WADRP report. It is notable and of importance to the EPA that it was stated that:

> *A matter of considerable moment raised during our discussions is the extent to which it might be possible for the timber harvesting industry to move closer to a strategy of dry season logging. Increased use of tactics such as stockpiling and light cable systems for harvest of thinnings might achieve significant improvements in hygiene.*

The Ferguson committee (Ferguson *et* al, 1999) in its report on karri and karri-tingle management recommended under the heading of Environmental Care (3.2.2) that:

> *Seasonal logging (from October to June approximately) should be extended in 2001 and used throughout the karri forest types by 2003, in order to minimise roading requirements, soil compaction and erosion, manage disease risk and improve protection of seed store and associated biodiversity. (Ferguson et al. 1999).*

The same reasoning applies to jarrah forest harvesting especially on duplex soils. In the jarrah forest there may also be a need for restraint in years of high summer rainfall when conditions can be most conducive to *Phytophthora cinnamomi* activity.

In the development of management guidelines the question of operational constraints should be addressed so there is consistency across industries. Some projects or developments may be conditional on the implementation of such operational constraints.

3.3.3 Enforcement

The issue of enforcement was one of the key concerns relating to implementation expressed in the submissions to the EPA. It is important that the public knows how the policy will be enforced and how success of the strategies will be evaluated. The EPA encourages the dedication of more resources to ensure that rigorous hygiene as stated in Recommendation 1 of the WADRP report will be enforced.

3.3.4 Resources

The question of the resources necessary to ensure adequate monitoring and appraisal of the protocol needs to be addressed by the DCC, CALM and industry. Recommendations 31, 32 and 33 of the WADRP report (presented below) as endorsed by the State Government should be addressed not only with respect to the funding of research but also to the funding of training and monitoring.

Recommendation 31. *That the State investigate ways and means of applying the user pays principle to those public utilities whose activities contribute significantly to costs of dieback management and control.*

Recommendation 32. *That ways and means be sought which would enable charging of all industries, including tourism, beekeeping and wildflower harvesting which use natural areas, for their share of management and research costs.*

Recommendation 33. *That an identifiable proportion of royalties and other charges and payments levied be allocated to dieback related research.*

3.4 Implications of the application of the protocol for dieback management in Western Australia

The EPA is of the view that the protocol will be difficult to implement in an effective manner. Of concern is that the current definition of 'protectable' may be open to misinterpretation and misuse as it relies on the prediction of rates of spread of the disease, although it is acknowledged in the text that this is often unpredictable. In some areas known to be vulnerable nothing is known about the epidemiology of the disease.

Community concerns have been raised about the possibility of *Phytophthora cinnamomi* spreading into currently uninfected areas of the jarrah forest as a result of logging if the protocol based on defining protectable areas is adopted without revision and without adequate resources being made available to ensure that the rules are adhered to by industry and standards of disease interpretation are high.

The EPA recognises the complexities associated with the development of a protocol for identifying protectable areas in relation to dieback, and their priority for management. The Dieback Consultative Council has provided, in its report to the Minister, a flowchart for determining vulnerability to damage by *Phytophthora cinnamomi*, the delineation of protectable areas and their priority for management.

If the protocol were to be adopted it should have the caveat that it be on a trial basis with rigorous documentation of the trial and an independent review of the outcomes of the trial within three years. The introduction of the protocol on a trial basis would require the development of a strategy during 2001 which sets out the responsibilities for managing the protocol, the documentation required, the key elements of a scientific monitoring program and the process of the review, including a comparison between the protocol being trialled and the past system of management.

A public awareness program is needed to inform the public about the significance of *Phytophthora cinnamomi* as a key threatening process. The impact of *Phytophthora cinnamomi* on the vegetation of Western Australia is a biological disaster of national and international significance.

The EPA is of the view that the operational rules for vehicles and machines is one of the most important aspects to be clearly understood and enforced. If the protocol were to be endorsed for continued implementation in the jarrah forest it should firstly be determined whether the 'clean on entry' rule for vehicles and machines entering areas defined as protectable is effective in

minimising new infections. This aspect should form part of any review undertaken.

It is important that the community has confidence that any rules that are developed for industries working in areas vulnerable to *Phytophthora* dieback impact are adhered to. The EPA concluded from discussions with stakeholders that the systems of enforcement were inadequate considering that the environmental costs of non-compliance with the operational rules could result in the irreversible loss of species and ecological communities.

The simplest way of minimising the risks of spreading the pathogen is to encourage industry groups to work in 'protectable' areas only under dry soil conditions. Such conditions could be simply defined in an operational sense as when vehicle movement results in some dust rising off roads For this reason, attention should be given to implementing recommendation 4 of the WADRP report, which states:

> *That industry, institutions and government agencies jointly address the extent to which operational schedules can be modified to ensure that activity on the protectable areas is focused on minimising access during conditions which are conducive to dispersal of the pathogen and its establishment.*

Once the strategies for policy implementation are agreed, further guidance will have to be provided to proponents of any new projects. Agencies and landholders will also need guidelines for the ongoing access to protectable areas.

The EPA considers that there is a need to integrate the range of databases available on the biodiversity (eg. RFA datasets) to enable a clearer definition of the ecosystems and species which are vulnerable to infection by *Phytophthora cinnamomi* in the southwest areas. The EPA considers that every effort should be made at a State level to minimise the spread and intensification of the diseases caused by the *Phytophthora cinnamomi* and the resulting environmental consequences.

Resources currently devoted to dieback protection and management in the State should be increased.

The EPA is not aware of any comprehensive estimates of the financial impact on the forest, horticulture, floriculture, tourism and honey industries within the State as a result of *Phytophthora cinnamomi* activities. Estimates of production at risk may be used to involve industries in funding dieback management in the State. The long-term effects of the disease on the sustainable levels of jarrah wood production is of particular importance in relation to ecological sustainable forest management.

As the State moves towards implementing ESFM, and possible certification of timber exports, it would be timely for industry to be involved in the issue of dieback management because *Phytophthora cinnamomi* will be a significant factor in the attainment of ESFM objectives.

4. CALM Policy Statement Number 3

In many submissions general concerns about policy and perceived deficiencies in methods for its implementation and enforcement were expressed. The spread of the pathogen is a significant threat to aspects of the State's biodiversity, and thus the approach to threat abatement must always be one of continuous improvement in both policy, strategic planning and management. The EPA

encourages the Conservation Commission to review CALM's Policy Statement Number 3 in the context of the recently developed State and Federal commitments to ESFM, as detailed in the RFA, and the national Threat Abatement Plan. This policy should be extended to apply to lands of all tenure and all landholders.

5. Research

Considering the enormity of the dieback problem, greater commitment to dieback research is required.

Research staff with a comprehensive knowledge of the disease and its expressions should be involved in the improvement of the protocol and the ongoing definition of protectable areas. It is critical that adaptive management, dependent on research, be practised as knowledge of the epidemiology of the disease is lacking for many of the ecosystems where logging and developments will be undertaken.

Further work is required on the identification and classification of communities vulnerable to dieback. It is suggested that CALM could interrogate existing data bases for State Forest to determine if there are communities vulnerable to infection by *Phytophthora cinnamomi* which would be classified as 'threatened' using the criteria of English and Blythe (1999). Input from taxonomists and ecologists would be required for the development of an adequate system for protecting threatened ecological communities. Criteria for the definition of high conservation status areas would have to be further developed. This suggestion is in line with research priorities identified in the RFA Attachment 11 in relation to the 'Protection and conservation of biodiversity'. Stated priorities were to:

- continue to identify species and communities with high conservation significance; and
- determine the impact of threatening processes on the structure and function of communities and devise management practices to ameliorate these processes.

A number of reports have generated lists of topics worthy of research (WADRP, Stretch Report 1992, DCC). The Dieback Research Advisory Group should develop, as a matter of urgency, a priority research program for dieback and this program, together with the proposed funding arrangements, should be circulated for public information.

The EPA encourages the DCC to address recommendations 31, 32, 33 of the WADRP about funding for research (see Appendix 1). There is an active research group at Murdoch University, but research into dieback within CALM appears to have become limited, apparently because of a lack of operating funds.

6. Policy development

The Conservation Commission has now been established and it has the responsibility for a range of conservation functions.

In view of the threat posed by *Phytophthora cinnamomi*, the EPA encourages the Conservation Commission to review this threat to biodiversity values.

7. EPA Advice

The EPA has recognised that management of the key threatening process posed by the pathogen *Phytophthora cinnamomi* is a very difficult task which has been the subject of many reviews and reports. However, the spread of the pathogen poses a significant threat to aspects of the State's biodiversity, and thus the approach to threat abatement must always be one of continuous improvement in research, policy, strategic planning and management. It is in this context that the EPA provides its advice, not only on the protocol, but also on some wider issues. In providing this advice, the EPA is mindful that the Parliament has now established a Conservation Commission whose functions include that of advising the Minister for the Environment on the development of policies and management of biodiversity and biodiversity components throughout the State.

In providing its advice the EPA has been greatly assisted by the public submissions on the subject. Whilst some of those submissions endorsed the protocol, others raised valid concerns that the application of the protocol would not assist in the control and management of the pathogen.

A summary of the EPA's advice is set out below.

7.1 Advice on the protocol

The EPA's advice to the Minister for the Environment on the protocol for identifying 'protectable areas' and their priority for management is that it be endorsed but with a caveat that it be on a trial basis with rigorous documentation of the trial and an independent review of the outcomes of the trial within three years.

The introduction of the protocol on a trial basis would require the development of a strategy during 2001 which sets out:

- the responsibilities for managing the trial;
- the documentation required;
- the key elements of a scientific monitoring program; and
- the process of review, including a comparison between the protocol being trialled and the past system of management.

Long-term implementation of the protocol should only be continued if independent auditing and scientific monitoring clearly demonstrates an improvement in the management of *Phytophthora cinnamomi* in State Forest areas.

Following the review of the trial, there will be a need to integrate the findings into the Forest Management Plan for 2004 and beyond.

The EPA advises that the application of the protocol to other areas of land tenure within the state of Western Australia should be held over until the scientific trial is reviewed.

7.2 Consideration of recommendations of the WA Dieback Review Panel

Urgent attention should be given to implementing Recommendation 4 of the Panel which states:

> *That industry, institutions and government agencies jointly address the extent to which operational schedules can be modified to ensure that activity on the protectable areas is focused on minimising access during conditions which are conducive to dispersal of the pathogen and its establishment.*

Detailed attention should be given to Recommendations 31, 32 and 33 of the Panel which state:

> Recommendation 31. *That the State investigate ways and means of applying the user pays principle to those public utilities whose activities contribute significantly to costs of dieback management and control.*
> Recommendation 32. *That ways and means be sought which would enable charging of all industries, including tourism, beekeeping and wildflower harvesting which use natural areas for their share of management and research costs.*
>
> Recommendation 33. *That an identifiable proportion of royalties and other charges and payments levied be allocated to dieback related research.*

Further consideration should be given to recommendation 8 of the Panel which states:

> *That the Department of Environmental Protection and CALM together ensure uniform application of restraints on access by all significant users in threatened areas.*

7.3 Precautionary approach

In the absence of sufficient data on the conservation values of areas which may be affected by operational activities, a precautionary approach to all access should be applied.

There is an urgent need to convey a simple message to the community that the most elementary way to protect the flora of the South-west from the threatening process of *Phytophthora* is to encourage operations to be undertaken under dry soil conditions.

7.4 High conservation status areas

CALM should be encouraged to interrogate the existing data and data gaps for species and communities which may be vulnerable to infection by *Phytophthora cinnamomi* both in the State Forest areas and throughout the State as a whole.

A supplementary and over-arching system should be developed to ensure that adequate protection is given to high conservation status areas. Criteria which define high conservation status areas should be developed as a matter of urgency. Criteria such as rare and endangered taxa, areas of high endemism, threatened ecological communities, old growth areas and diverse ecotype zones should be considered.

Community involvement should be encouraged in the recognition and protection of high conservation status areas.

7.5 Policy development

The EPA encourages the Conservation Commission to review CALM's Policy Statement Number 3 in the context of the recently developed State and Federal commitments to ESFM as detailed in the RFA, and the national Threat Abatement Plan. This policy should be extended to apply to lands of all tenure and all landholders.

During any revision of Policy Statement Number 3, aimed at making it more broadly applicable to lands of all tenure, attention should be given to adopting terminology consistent with the Guidelines developed by the Dieback Working Group for Managing *Phytophthora* in areas managed by Local Government. (Dieback Working Group, 2000).

Losses caused by *Phytophthora cinnamomi* as a key threatening process should be estimated in terms of all industries affected, including the jarrah sawn timber industry, and the implications for their sustainability should be reported upon, together with the assumptions underlying the estimates.

7.6 Research

There is an urgent need for the dieback research effort in Western Australia to be invigorated, and efforts should be made to establish a Centre of Excellence for Dieback Research. The development of such a Centre should be supported by Government at all levels with the view to attracting additional Federal and industry funds.

Adequate resources should be made available for CALM to assist in the further development of a protocol for identifying protectable areas, particularly in regions or ecosystems where little or no work has been done on the epidemiology of the disease. Further work is required on the criteria by which the vulnerability of flora and communities is assessed, which is an essential step in applying the protocol.

The Dieback Research Advisory Committee should develop, as a matter of urgency, a research program and this program, together with the proposed funding arrangements, should be circulated for public information.

7.7 Scientific monitoring

Scientific monitoring the rate of autonomous spread of *Phytophthora cinnamomi* under different conditions and in different ecosystems should be a minimum requirement of all landowners and operators, if a decision is taken to retain the protocol.

Information from past monitoring of dieback spread should be collated and made public.

7.8 Training

Certification standards for professional dieback interpreters should be established and responsibilities for training allocated between CALM, tertiary institutions and industry.

Certification standards for professional ecologists and foresters determining biodiversity values should be established and responsibilities for training allocated between CALM, tertiary institutions and industry.

7.9 Enforcement

Adequate resources should be made available for enforcement of hygiene regulations so that biological values of high value are not put at risk. It is important that the community has confidence that agreed rules and regulations are enforced.

7.10 Funding

Attention should be given to Recommendations 31, 32 and 33 of the 1996 Review of Dieback in Western Australia (see Appendix 1). These recommendations included the words "the State investigate ways and means of applying the user pays principle", "that ways and means be sought which would enable charging of all industries … for their share of management and research costs", and "an identifiable proportion of royalties and other charges and payments levied be allocated to dieback related research".

7.11 Interaction between the Dieback Consultative Council and the Conservation Commission

The Conservation Commission, which has the responsibility for policy development to protect the natural environment, should be requested to liaise with the Dieback Consultative Council to avoid any duplication of roles in relation to their respective responsibilities.

7.12 Public awareness

The impact of *Phytophthora cinnamomi* on the vegetation of Western Australia is a major environmental issue, and there should be an on-going awareness program to inform the public about its significance.

A program to address the threat of dieback, with status such as 'Western Shield' and 'Project Western Everlasting' should be developed for the protection of flora and vegetation at risk of extinction from *Phytophthora cinnamomi*.

8. Selected reading

Carstairs, S. A. and Newcombe, L. E. (1997) The control and management of *Phytophthora megasperma* in native plant communities of Western Australia. In: Murray, D. (Ed) 1997 Control of *Phytophthora* and *Diplodina* canker in Western Australia. Final report to the Threatened species and Communities Unit, Biodiversity Group, Environment Australia.

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Environment Protection Authority. (1998) Advice in relation to the development of the Regional Forest Agreement in Western Australia; Progress Report on Environmental Performance and mid-term report on compliance; Forest Management Plans 1994-2003. EPA Bulletin 912, November 1998.

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Lamont, B., Perez-Fernandez, M. A. and Mann, R. (1997) Ecosystem processes and key disturbances in the south-west forest region of Western Australia. Report to the Commonwealth and Western Australia Governments for the WA Regional Forest Agreement.

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Podger, F.D., James, S. H. and Mulcahy, M. J. (1996) Review of Dieback in Western Australia. Volume 1 Report and Recommendations. Report by the Western Australian Dieback Review Panel to the Hon. Minister for the Environment. Perth.

Western Australia Parliament, Legislative Council, Select Committee into the Spread of Dieback in National Parks and Conservation Reserves. The final report of the Select Committee into Dieback Diseases presented by the Hon. W.N. Stretch MLC (Chairman). Perth: The Committee, 1992.

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APPENDIX 1

Recommendations of the Report of the Dieback Review Panel, 1996

Endorsed by Government
(see Media Statement by the Minister for the Environment, 24 November 1997)

Recommendation 1

That Government adopts a dieback management strategy which identifies significant protectable areas (those for which the values at risk are significant and the benefits of hygiene likely to be sustained for more than a few decades), prioritises them and concentrates available resources on rigorous application of hygiene for their protection.

Recommendation 2

That fewer restrictions on access be applied to and within essentially unprotectable areas.

Recommendation 3

That CALM urgently develop protocols for the objective identification of protectable areas and for their prioritisation and management.

Recommendation 4

That industry, institutions and government agencies jointly address the extent to which operational schedules can be modified to ensure that activity on the protectable areas is focused on minimising access during conditions which are conducive to dispersal of the pathogen and its establishment.

Recommendation 5

That joint planning and management arrangements be facilitated by establishment of regional coordination groups for industries and organisations with extensive operations that have a potential to spread the pathogen. CALM should provide the necessary technical advice and support.

Recommendation 6

That CALM re-establish a staff position (the Dieback coordinator role) with responsibility for internal coordination and for more effective discharge of its responsibilities for protection of the biota against *P. cinnamomi* in areas both inside and outside its estate.

Recommendation 7

That the Dieback Coordinator also have responsibility for facilitating field coordination between agencies in the Regional Coordination Groups and promoting close collaboration between research scientists and land managers.

Recommendation 8

That the Department of Environmental Protection and CALM together ensure uniform application of restraints on access by all significant users in threatened areas.

Recommendation 9

That a training and accreditation program be instituted to ensure that all who go on protectable areas, including industry operators, CALM staff and research scientists, are fully aware of what is needed to ensure integrity of hygiene.

Recommendation 10

That the revision of manuals pertaining to dieback hygiene be improved and promptly distributed.

Recommendation 11

That the ability to meet operational mapping requirements be promptly expanded through the simplification of mapping categories.

Recommendation 12

That such inducements as are necessary to maintain a cadre of experienced interpreters be identified and implemented.

Recommendation 13

That CALM develop a more effectively coordinated and adequately resourced operation for the priority treatment of populations of rare flora, especially with phosphonate.

Recommendation 14

That terminology used in dieback management be revised, standardised and published.

Recommendation 15

That research into the reproductive biology and virulence of species of *Phytophthora* which occur in native vegetation, and which is necessary for a clearer understanding of both their population genetics and their importance as pathogens, be actively promoted.

Recommendation 16

The programs for breeding resistance in *Pinus radiata* and jarrah be sustained and similar programs for other appropriate species be encouraged.

Recommendation 17

That basic research into the cellular biochemistry of host/pathogen interactions be encouraged. These fields of research may best be conducted in University Departments and CSIRO, and where appropriate should enlist the capabilities of medical and paramedical research laboratories.

Recommendation 18

Research proposals which show some clear prospect of leading to development of successful mechanisms for biocontrol should be considered for support.

Recommendation 19

That research into methods for *ex situ* conservation and germplasm storage be encouraged.

Recommendation 20

That refinement of techniques for application of phosphonate and the development of understanding of the mechanism of action should be encouraged.

Recommendation 21

That geophysical and remote sensing methods be further investigated with a view to their use in location of subsurface features affecting the hazard rating of forest sites.

Recommendation 22

Progressive refinement of hygiene strategies which will reduce risk of infestation in operations be undertaken.

Recommendation 23

That the role of fire in the management of those rare species which are threatened by *Phytophthora* root rot be further investigated.

Recommendation 24

That the Minister for the Environment establish a Dieback Consultative Council (DCC) reporting directly to him through an independent chairman:

That membership should:

- include representatives of CALM management and research, from relevant industries and utilities, and appropriate representation from the scientific community;
- be constituted with a membership capable of providing independent advice to the Minister on the broader issues of policy and strategy that he might seek from time to time; and
- include a secretariat provided by CALM's Dieback Coordination Unit.

The functions of the DCC should be:

- to establish close liaison between planners, managers and research scientists;
- to ensure that a high priority is given to research generated by management needs;
- to publish reviews of research findings and their implications for both management and further research;
- to recommend on acquisition and allocation of research funding according to its perceived priorities; and
- to advise on appropriate institutions to carry out the work.

Recommendation 25

That CALM identify and recruit a senior scientist experienced in wildland plant pathology to provide urgently needed leadership in the dieback research program and to promote close collaboration with land managers through the Dieback Coordinator.

Recommendation 26

That CALM's research program give priority to applied projects related to management needs. Fundamental research and work beyond its competence should be contracted out.

Recommendation 27

That CALM consider adopting 'program budgeting' in allocating funds according to departmental programs and priorities.

Recommendation 28

That CALM's Science and Information Division establish an internal Publications Review Panel consisting of research scientists. It should arrange review by practising scientists (in house or outside if necessary) of draft research papers in respect of the validity of scientific conclusions, and recommend accordingly to the Executive Director.

Recommendation 29

That strictly scientific papers recommended by the Publications Review Panel be published without delay.

Recommendation 30

That CALM makes a clear distinction between primary research papers which report scientifically valid conclusions, and policy documents derived from them and other sources.

Recommendation 31

That the State investigate ways and means of applying the user pays principle to those public utilities whose activities contribute significantly to costs of dieback management and control.

Recommendation 32

That ways and means be sought which would enable charging of all industries, including tourism, beekeeping and wildflower harvesting which use natural areas, for their share of management and research costs.

Recommendation 33

That an identifiable proportion of royalties and other charges and payments levied be allocated to dieback related research.

APPENDIX 2

Recommendations of the Final Report of the Select Committee into Dieback Diseases

(quoted in full from Parliament of Western Australia, September, 1992, p. 6 - 11)

Recommendation 1

The Committee supports the current quarantine measures taken by CALM to limit the spread of dieback disease by restricting access to critical areas

Recommendation 2

The Committee recommends that CALM in its role as the manager of most of Western Australia's public land, should use its discretion freely but reasonably to have its Minister quarantine areas under particular threat of dieback infection, or dieback spread within an infected area, without waiting for a full management plan; notwithstanding such a declaration, current bona fide commercial users of an area to be quarantined would be encouraged to negotiate access rights where this would not directly jeopardise dieback control measures being implemented. In addition a special effort needs to be taken to clearly and simply explain to local people the necessity for such action and an emergency budget allocation made to fund this effort.

Recommendation 3

That the Department of Conservation and Land Management intensify its campaign to educate the public on the ways dieback is spread and the public role in limiting the proliferation of these killer fungi; and enlist the aid of supportive community groups whenever possible; the primary targets of this campaign should be touring groups, park users and school communities.

Recommendation 4

That a "Dieback Pack" of information be developed by CALM and the R.A.C. aimed at educating motorists and in particular 4WD vehicle users on preventative measures, and that the pack be supplied at reasonable cost (if necessary) to motorists and also placed in the glove box of all 4WD vehicles offered for sale.

Recommendation 5

The Committee recommends the formation of local "Friends of the Park" type voluntary groups to provide advice and support for the management of National Parks and reserve lands in their area and that a CALM officer have a key role with each of these voluntary groups to provide additional expert and scientific input. It also encourages the Government to consider giving such groups legislative support similar to that enjoyed by Land Conservation District Committees (LCDCs).

Recommendation 6

That a simple, clear and brief information pamphlet be distributed to all shires, farmers and householders outlining the dangers and methods of spread of dieback and simple hygiene measures needed to limit its spread.

Recommendation 7

The Committee recommends that as soon as is practicable all road reserves in known or suspected dieback areas be tested for the presence of the disease in order to establish a disease profile of each road, so that appropriate disease control measures can be implemented during reconstruction and maintenance work.

Recommendation 8

The Committee recommends that the Government review relevant sections of the Act and the Mining Act with the object of making road-building materials available from public lands for the purpose of building better quality and relatively cheaper roads where the dieback-diseases status of such material to be supplied is tested and found appropriate to the disease status of the road reserve being improved.

Recommendation 9

The Committee urges the Government to ensure that adequate funding is directed to the mapping and interpretation of dieback risk areas, where the spread of the disease is expected to be quickest and most damaging. A list of priority areas should be drawn up by a top-level Advisory group comprising CALM and industry representatives including:

(I) Horticulture;
(ii) apiarists;
(iii) Local Government;
(iv) conservationists;
(v) tour operators;
(vi) foresters; and
(vii) miners.

Recommendation 10

The Committee recommends that very high priority be given to the development of quicker and cheaper diagnostic methods of detecting dieback pathogens, and that private research companies and individuals also be invited to contract for this development.

Recommendation 11

The Committee notes Western Australia's achievements in research and treatment of dieback diseases and recommends that all avenues of research should be co-ordinated as far as is commercially appropriate, to achieve a greater and wider research base and speedier resolution of the problems of dieback diseases.

Recommendation 12

Research grants, should be made wherever possible to local research companies, individuals and institutions so that Western Australian benefits economically from the technology developed in dieback disease control.

Recommendation 13

The Committee urges the Government to ensure that CALM keeps close contact with the agricultural and horticultural industries and if possible with their research base and control practices.

Recommendation 14

The Committee recommends that CALM and the new dieback research programme at Murdoch University maintain a public "running list" of minor and major research targets that could be taken up by tertiary graduates, private researchers and industries.

Recommendation 15

The Committee recommends that following the election due in 1993, the Committee be reconstituted to further investigate the areas which were peripheral to the Committee's current Terms of Reference, as well as some additional issues that have arisen late in the Committees' deliberations and will require more time to investigate.

Recommendation 16

That the Government instruct CALM to make a very strenuous effort to discover and help local communities establish suitable short and medium stay camping areas near popular local recreation spots where the risk of dieback spread is minimal or manageable, especially in the lower rainfall areas East of Bremer Bay.

Recommendation 17

The Committee recommends that licences be issued from local District Offices of CALM and that pickers can only be employed after they have been given instruction and accreditation by CALM on how to collect flowers without spreading Phytophthora and leaving unnecessary scars on plants thus allowing entry of the Aerial Canker fungi which are now prevalent on the south coast areas particularly.

Recommendation 18

The Committee is confident that mining operations can proceed in or adjacent to dieback infected areas provided effective quarantine and hygiene practices are observed at all stages of exploration, mining and transport of materials. Such practices must continue to be observed strictly, and monitored closely.

Recommendation 19

The Committee believes that a large proportion of the registration fees obtained from the apiarists should be directed back into dieback research in these areas. The Committee urges the Government to ensure that every effort is made to allow beekeepers access to safe sites close to dieback areas so that bees can range over any honey-flow in such areas.

Recommendation 20

The Committee recommends that a Dieback Research Foundation/Trust/Fund be established under legislation to receive contributions from public and corporate sources for funding research projects on dieback diseases. We recommend that Tax Deductible Status is sought for donations to this fund.

Recommendation 21

The Dieback research Foundation should be administered by a high profile non-government Council representing Industry, Academia, Independent researchers and CALM with the Chairman being a senior officer of CALM.

Recommendation 22

The Committee recommends that the Government strongly opposes any proposal to move dieback research, or research funds, away from Western Australia.

By actively promoting Western Australia's advanced level of dieback management and research, it should be possible to attract joint research projects to this State along with an appropriate share of the funding for such research.

Recommendation 23

The Committee recommends that the Dieback Research Foundation actively seeks out-of-State industries to conduct jointly funded dieback research in Western Australia where so much advanced study and research is already taking place.

APPENDIX 3

Key Aspects of the Threat Abatement Plan for Dieback Caused by the Root-rot fungus (*Phytophthora cinnamomi*) (Draft July 1999)

The Threat Abatement Plan states:

"Management of phytophthora dieback in Australia requires a long-term approach. It is highly desirable, from the point of view of both conservation and sustainable forest management, that there be no further spread of the fungus. The ultimate goal of the threat abatement process is therefore to halt the spread of phytophthora dieback and lessen its effects within its current distribution. But currently available mitigation methods do not allow for this." (p. 1)

and

"Complete removal of *P. cinnamomi* - nationwide or in a local area - is beyond the capacity of available techniques and resources." ....

"Protection of uninfected areas from the arrival of the pathogen or suppression of its effects on a localised area of high conservation value may be feasible provided a sufficiently rapid, well-funded and persistent campaign can be mounted." (p.25)

"The Threat Abatement Plan has two broad goals:

- to protect endangered or vulnerable native species and communities from *Phytophthora cinnamomi;*
- to prevent further species from becoming endangered by reducing the chance of exposure to the pathogen." (p. 40)

"There are six primary objectives for the Plan:

- **objective 1 -** promote the recovery of endangered or vulnerable species and ecological communities that are threatened by phytophthora dieback;
- **objective 2 -** prevent phytophthera dieback invading new areas where it may threaten species or ecological communities with extinction;
- **objective 3 -** improve our knowledge and understanding of phytophthora dieback's ecology, vulnerabilities and effects and its interactions with other species;
- **objective 4 -** increase the effectiveness and efficiency of phytophthora dieback-control mechanisms;
- **objective 5 -** inform management agencies, landholders and the public about the Threat Abatement Plan's actions and their outcomes;

- **objective 6 -** effectively coordinate phytophthora dieback-control activities." (p. 40)

The aim of the Threat Abatement Plan is to significantly reduce phytophthora dieback's impact on Australian flora within five years. It proposes to do this in four main ways:

- "by increasing our understanding of where the pathogen currently is, which areas and species are vulnerable to it, and why the impacts of the epidemic are much less severe along the eastern seaboard;

- by reducing the pathogen's spread into new areas;

- by treating localised areas containing high conservation values (such as rare and threatened species) with phosphonate, a chemical that induces resistance to *P. cinnamomi* in native plants;

- by coordinating regionally variable action on the part of the large number of people and organisations - in government, industry and the wider community - with an interest in the problem." (p.vii - viii).

APPENDIX 4

LIST OF SUBMITTERS

***Phytophthora cinnamomi* and disease caused by it – a protocol for identifying 'protectable areas' and their priority for management**

Commonwealth, State and local government agencies

Water & Rivers Commission
Western Power
Kings Park & Botanic Garden – Bold Park
CALMscience

Universities and research organisations

CSIRO
Murdoch University
Curtin University of Technology

Organised groups and members of the public

Conservation Council of WA
Collie Conservation Group
Blackwood Friends of the Forest
Bridgetown Greenbushes Friends of the Forest
Leeuwin Conservation Group (Inc)
Wildflower Society of WA
WA Forest Alliance
Preston Environment Group
LCDC, Boyupbrook
Worsley Alumina Pty Ltd
Forest Industries Federation WA Inc
Dr Frank Podger
HM & BC Churchward
Mr Dean Hasslet
Ms Vanessa Klok